

## CLAIMS

We claim:

1. A heat seal die for forming a heat seal between two heat sealable surfaces comprising:
  - a first die member having a longitudinal axis and a die face;
  - a second die member having a longitudinal axis and a die face;
  - a first heating element engaged with the first die member for heating the first die member;
  - a second heating element engaged with the second die member for heating the second die member;
  - a first longitudinal heat tube tightly disposed in a first longitudinal bore in the first die member between the first heating element and the die face of the first die member for maintaining a substantially uniform heat seal temperature along the die face of the first die member; and
  - a second longitudinal heat tube tightly disposed in a first longitudinal bore in the second die member between the second heating element and the die face of the second die member for maintaining a substantially uniform heat seal temperature along the die face of the second die member.
2. A heat seal die as in claim 1 wherein the heat seal die is structured and arranged for manufacturing portion control sized packaged flowable material.
3. A heat seal die as in claim 1 wherein the die face of the first die member has at least one longitudinal land and the second die member has at least one longitudinal groove for receiving the at least one longitudinal land in a mating arrangement.
4. A heat seal die as in claim 1 wherein the die face of the first die member has a plurality of alternating lands and grooves and the die face of the second die member has a plurality of alternating lands and grooves, the lands and grooves of the first die member and the lands and grooves of the second die member structured and arranged for selective mating arrangement.

5. A heat seal die as in claim 1 wherein:

the first die member extends along the longitudinal axis of the first die member from a first end to a second end and the first longitudinal heat tube extends from the first end of the first die member to the second end of the first die member; and

the second die member extends along the longitudinal axis of the second die member from a first end to a second end and the second longitudinal heat tube extends from the first end of the second die member to the second end of the second die member.

6. A heat seal die as in claim 1 wherein:

the first die member has first and second longitudinal sides and a raised portion extending from between the first and second longitudinal sides, the raised portion of the first die member including the die face of the first die member and sloping walls extending from respective first and second sides to the die face of the first die member; and

the second die member has first and second longitudinal sides and a raised portion extending from between the first and second longitudinal sides, the raised portion of the second die member including the die face of the second die member and sloping walls extending from respective first and second sides to the die face of the second die member.

7. A heat seal die as in claim 1 wherein:

the first die member has an upwardly facing first longitudinal side, a downwardly facing second longitudinal side, and a temperature sensor disposed in the downwardly facing second longitudinal side; and

second first die member has an upwardly facing first longitudinal side, a downwardly facing second longitudinal side, and a temperature sensor disposed in the downwardly facing second longitudinal side.

8. A heat seal die as in claim 1 wherein the first heating element is a heating cartridge disposed in a second longitudinal bore in the first die member and the second heating element is a heating cartridge disposed in a second longitudinal bore in the second die member.

9. A system for making portion control sized packaged flowable material comprising:

a heat sealable material feeder;

a flowable material feeder; and

a form/fill/seal apparatus for receiving the heat sealable material, forming a package with the heat sealable film, filling the package with the flowable material, and sealing the package, the form/fill/seal apparatus including a heat seal die comprising:

a first die member having a longitudinal axis and a die face;

a second die member having a longitudinal axis and a die face;

a first heating element engaged with the first die member for heating the first die member;

a second heating element engaged with the second die member for heating the second die member;

a first longitudinal heat tube tightly disposed in a first longitudinal bore in the first die member between the first heating element and the die face of the first die member for maintaining a substantially uniform heat seal temperature along the die face of the first die member; and

a second longitudinal heat tube tightly disposed in a first longitudinal bore in the second die member between the second heating element and the die face of the second die member for maintaining a substantially uniform heat seal temperature along the die face of the second die member.

10. A system as in claim 9 wherein the system is structured and arranged for packaging condiments.

11. A system as in claim 9 wherein the system is structured and arranged for packaging condiments in portion a portion size in the range from 1 to 5 ounces.

12. A system as in claim 9 wherein the die face of the first die member has at least one longitudinal land and the second die member has at least one longitudinal groove for receiving the at least one longitudinal land in a mating arrangement.

13. A system as in claim 8 wherein the die face of the first die member has a plurality of alternating lands and grooves and the die face of the second die member has a plurality of alternating lands and grooves, the lands and grooves of the first die member and the lands and grooves of the second die member structured and arranged for selective mating arrangement.

14. A system as in claim 9 wherein:  
the first die member extends along the longitudinal axis of the first die member from a first end to a second end and the first longitudinal heat tube extends from the first end of the first die member to the second end of the first die member; and  
the second die member extends along the longitudinal axis of the second die member from a first end to a second end and the second longitudinal heat tube extends from the first end of the second die member to the second end of the second die member.

15. A system as in claim 9 wherein:  
the first die member has first and second longitudinal sides and a raised portion extending from between the first and second longitudinal sides, the raised portion of the first die member including the die face of the first die member and sloping walls extending from respective first and second sides to the die face of the first die member; and

the second die member has first and second longitudinal sides and a raised portion extending from between the first and second longitudinal sides, the raised portion of the second die member including the die face of the second die member and sloping walls extending from respective first and second sides to the die face of the second die member.

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16. A system as in claim 9 wherein:

the first die member has an upwardly facing first longitudinal side, a downwardly facing second longitudinal side, and a temperature sensor disposed in the downwardly facing second longitudinal side; and

second first die member has an upwardly facing first longitudinal side, a downwardly facing second longitudinal side, and a temperature sensor disposed in the downwardly facing second longitudinal side.

17. A system as in claim 9 wherein the first heating element is a heating cartridge disposed in a second longitudinal bore in the first die member and the second heating element is a heating cartridge disposed in a second longitudinal bore in the second die member.

18. A method for making portion control sized packaged flowable material comprising:

feeding heat sealable film and a flowable material to a form/fill/seal apparatus comprising a heat seal die;

forming a package with the heat sealable material;

filling the package with the flowable material; and

sealing the package with the heat seal die,

the heat seal die comprising:

a first die member having a longitudinal axis and a die face;

a second die member having a longitudinal axis and a die face;

a first heating element engaged with the first die member for heating the first die member;

a second heating element engaged with the second die member for heating the second die member;

a first longitudinal heat tube tightly disposed in a first longitudinal bore in the first die member between the first heating element and the die face of the first die member for maintaining a substantially uniform heat seal temperature along the die face of the first die member; and

a second longitudinal heat tube tightly disposed in a first longitudinal bore in the second die member between the second heating element and the die face of the second die member for maintaining a substantially uniform heat seal temperature along the die face of the second die member.

19. A method as in claim 18 wherein the fluid material is a condiment.

20. A method as in claim 19 wherein the condiment is packaged in a portion size within the range from 1 to 5 ounces.

21. A method as in claim 18 wherein the die face of the first die member has at least one longitudinal land and the second die member has at least one longitudinal groove for receiving the at least one longitudinal land in a mating arrangement.

22. A method as in claim 20 wherein the die face of the first die member has a plurality of alternating lands and grooves and the die face of the second die member has a plurality of alternating lands and grooves, the lands and grooves of the first die member and the lands and grooves of the second die member structured and arranged for selective mating arrangement.

23. A method as in claim 18 wherein:

the first die member extends along the longitudinal axis of the first die member from a first end to a second end and the first longitudinal heat tube extends from the first end of the first die member to the second end of the first die member; and

the second die member extends along the longitudinal axis of the second die member from a first end to a second end and the second longitudinal heat tube extends from the first end of the second die member to the second end of the second die member.

24. A method as in claim 18 wherein:

the first die member has first and second longitudinal sides and a raised portion extending from between the first and second longitudinal sides, the raised portion of the first die member including the die face of the first die member and sloping walls extending from respective first and second sides to the die face of the first die member; and

the second die member has first and second longitudinal sides and a raised portion extending from between the first and second longitudinal sides, the raised portion of the second die member including the die face of the second die member and sloping walls extending from respective first and second sides to the die face of the second die member.

25. A method as in claim 18 wherein:

the first die member has an upwardly facing first longitudinal side, a downwardly facing second longitudinal side, and a temperature sensor disposed in the downwardly facing second longitudinal side; and

second first die member has an upwardly facing first longitudinal side, a downwardly facing second longitudinal side, and a temperature sensor disposed in the downwardly facing second longitudinal side.

26. A method as in claim 18 wherein the first heating element is a heating cartridge disposed in a second longitudinal bore in the first die member and the second heating element is a heating cartridge disposed in a second longitudinal bore in the second die member.